DMAD RESERVOIR

Introduction

DMAD Reservoir is a large reservoir in the eastern Sevier Desert near Delta, UT. It is an impoundment of the lower reaches of the Sevier River. Much of the water has been removed by upstream users, reducing the river to a fraction of its prehistoric size. The reservoir is an impoundment of the river valley, where it has cut through some deposits, forming a serpentine valley about 1 mile wide and 80 feet deep. The reservoir is also called Delta Reservoir, and is referred to as "*The* D.M.A.D.".

The DMAD is a large reservoir, created in 1959 by the construction of an earth-fill dam and a north dike. The reservoir shoreline is mostly publicly owned by the BLM, but some state and private lands also abut the reservoir. Public access is unrestricted. Current water use is for warm water

Characteristics and Morphometry

Lake elevation (meters / feet)	1,422 / 4,665
Surface area (hectares / acres)	485 / 1,199
Watershed area (km^2 / $miles^2$)	13,803 / 5,364
Volume (m^3 / acre-feet)	
capacity	13,600,000 / 10,990
conservation pool	None
Annual inflow (m^3 / acre-feet)	not measured
Retention time (years)	>1
Drawdown (m^3 / acre-feet)	12,335,019 / 10,000
Depth (meters / feet)	
maximum	7 / 24
mean	3 / 9
Length (km / miles)	2.9 / 1.8
Width (meters / feet)	0.4 / 0.25
Shoreline (km / miles)	10.1 / 6.3

Location

County	Millard
Longitude / Latitude	112 28 22 / 39 23 54
USGS Map	Strong 1985
DeLorme's Utah Atlas & Gazetteer™	Page 36, A-2, 44, D-2
Cataloging Unit	Lower Sevier (16030005)

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aquatic habitat, recreation, and consumed for irrigation and cooling for the two Intermountain Power Project (IPP) coal burning power plants. Although IPP owns significantly more water for future expansion, they currently use an average of 18-20,000 acre-feet per year for cooling and lease their other water for downstream irrigation. The IPP desires to build two additional plants, which would double their water needs.

Recreation

DMAD Reservoir is between Delta and Lynndyl on US-6. Access is several miles south of the airport on US-6. Access to the dam is from a dirt road at the south end of "the river dip"–the 1/2 mile stretch of US-6 that dips into the Sevier River Valley. This road to the reservoir is marked with a small wooden sign. The turnoff, at the south end of the river dip, is 4.5 miles northeast of Delta and 12 miles south west of Lynndyl. Access to the north shore of the reservoir is from several roads leaving US-6 several miles north of the river dip.

The lake is used for fishing and boating. Usage is very low. The land that is now submerged by the reservoir was not cleared of trees and vegetation before flooding, making recreation somewhat hazardous and unappealing. Fish production is low.

The area immediately around the lake offers primitive camping. There are no public campgrounds in the area, but there are several RV Parks in Delta (see info box).

Watershed Description

DMAD Reservoir is an impoundment of the Sevier River Valley, a serpentine channel cut through alluvial deposits on the desert floor. The valley is about 1/2 mile wide and 80' deep. The reservoir impounds a segment of the valley about two miles long. The area around the reservoir is low level desert with grass-sage vegetation.

The watershed covers the entire Sevier River Drainage, from the Paunsaugunt and Markagunt Plateaus in the south, the west face of the Escalante Mountains, the Awapa Plateau, the Sevier Plateau, the east slopes of the Tushars and Pavant Ranges, the San Pitch Mountains, and the east face of the Wasatch Plateau. Everything from Bryce Canyon N.P. to Nephi drains into the DMAD.

The watershed high point, Delano Peak in the Tushar Mountains, is 3,709 m (12,167 ft) above sea level, thereby developing a complex slope of 2.0% to the reservoir. The inflow and outlet is the Sevier River. Some wells also provide water to the reservoir. The average stream gradient above the reservoir is 0.02% (8 feet per mile). Upstream reservoirs, Chicken Creek and Sevier Bridge, protect the DMAD from direct impacts from upstream pollutants.

The watershed contains substantial amounts of all the major soil types found in the state. See Appendix III for soil composition data.

The vegetation communities consist of pine, spruce-fir, aspen, oak-maple, pinyon-juniper, sagebrush-grass, bitterbrush, shadscale, and greasewood. The watershed receives 20 - 102 cm (8 - 40 inches) of precipitation annually. The frost-free season around the reservoir is 140 - 160 days per year.

The largest use of land in the watershed is multiple use land (69.6%). These lands are administered by the BLM, USFS, and the State of Utah. Grazing, recreation, and logging occur on many areas of these lands. Native grazing (mostly cattle and sheep) comprise 18.5% of the watershed. Irrigated cropland (7.2%), pasture and hay fields (4.1%), wildlife (3.5%), urban (0.7%), and recreation (0.05%) make up the remainder of the watershed. The major use of the watershed is livestock grazing, resulting in heavy runoff and substantial soil erosion.

Limnological Assessment

Before the Sevier River was dammed, the river emptied into Sevier Lake, about 30 miles west of Delta,

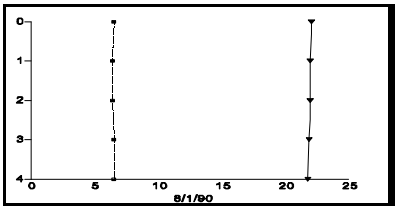
Limnological Data

Data averaged from STORET sites: 494140, 494141, 494142

Surface Data	1979	1990	1992
Trophic Status	E	H	E
Chlorophyll TSI	-	47.12	42.36
Secchi Depth TSI	-	81.93	82.39
Phosphorous TSI	50.00	66.82	47.27
Average TSI	-	65.29	57.34
Chlorophyll a (ug/L)	-	5.4	4.5
Transparency (m)	-	0.2	0.32
Total Phosphorous (ug/L)	40	78	20
pH	8.5	8.2	8.4
Total Susp. Solids (mg/L)	14	38	13
Total Volatile Solids (mg/L)	-	-	5
Total Residual Solids (mg/L)	-	-	8
Temperature (°C / °f)	13/55	19/66	13/55
Conductivity (umhos.cm)	1690	1746	1622
Water Column Data			
Ammonia (mg/L)	.1	0.04	0.03
Nitrate/Nitrite (mg/L)	.6	-	0.30
Hardness (mg/L)	440	417	375
Alkalinity (mg/L)	244	244	218
Silica (mg/L)	-	-	18.9
Total Phosphorous (ug/L)	40	77	27
Miscellaneous Data			
DO (Mg/l) at 75% depth	-	8.5	8.3
Stratification (m)	-	NO	NO
Limiting Nutrient	P	N	N
Depth at Deepest Site (m)	-	4.0	1.5

where all the water evaporated. Because of the high evaporative potential of the river flowing across the desert, all chemicals in the water become increasingly concentrated.

This is not as apparent in the upper reaches of the river, but when water reaches Delta, it is very hard and nutrient-rich. The DMAD is only slightly upstream from Sevier Lake (now dry), and like the lake, it loses much water to evaporation and becomes extremely nutrient rich.



D	ºC	pH	DO	Cond
0	22.1	8.3	6.5	1,870
1	22.0	8.3	6.4	1,870
2	22.0	8.3	6.4	1,870
3	21.9	8.3	6.5	

The DMAD is used as a storage reservoir for the Delta area. During the growing season, water is released from the Sevier Bridge Reservoir and stored in the DMAD or other reservoirs in the Delta area. The water level in the DMAD can go up and down several times during the summer, resulting in a short retention time of the water and mitigating the problem of high evaporation rates.

The water quality of DMAD Reservoir fair. It is considered hard with hardness an average concentrations of (235 mg/L (CaCO3). The hardness may tend to increase during drought conditions due to high evaporation and a low inflow of higher quality water.

The DMAD is in compliance with all parameters except total phosphorous. The state pollution indicator is 25 ug/L, and the DMAD averages 48 ug/L. It should be noted that in 1992 the average was only slightly higher at 27 ug/L. This has a negative effect on aquatic life, but does not impair water use for irrigation or industrial cooling. Although this study did not obtain total dissolved solids (TDS) concentrations, it is evident with conductivity values approaching 2000 umhos/cm^2 that the TDS standard of 1200 for irrigation waters is close to being exceeded. In addition the high turbidity associated with shallow reservoirs and the high alkalinity and hardness may inhibit the biological potential for algae growth which will reduce the impact on water quality.

TSI values for the reservoir indicate that the reservoir is a eutrophic to hypereutrophic reservoir. These values are consistently in excess of 50.00. Data also indicates that the system is predominately a nitrogen limited system. Stratification and low dissolved oxygen are typically not problems as depicted in the August 1, 1990 profile. Due to the shallow nature of the reservoir and various climatic factors there is probably continual mixing of the water column.

Because of the vast size of the watershed, it is unlikely that any specific measures can be taken to reduce phosphorous inputs. Upstream reservoirs are also eutrophic. Water quality improvement projects in various portions of the watershed will help, but given the concentrated nature of chemicals in the lower river, it is unlikely the DMAD will come into compliance in the near future.

The DMAD is not stocked with fish by the DWR. It contains populations of catfish (*Ictalurus punctatus*), white bass (*Morone chrysops*), carp (*Cyprinus carpio*), walleye (*Stizostedion vitreum*) and white crappie (*Pomoxis annularis*). It is one of the few waters in the state with populations of white crappie. All fish populations are self-sustaining. The reservoir has not been chemically treated to control rough fish competition, although the DWR would like to treat it when funds become available.

Information

Management Agencies	
Bureau of Land Management	539-4001
House Range Resource Area (Fillmore)	743-6811
Six County Commissioners Association	896-9222
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146
Recreation	
Panoramaland Travel Region (Richfield)	896-9222
Delta Chamber of Commerce	864-4316
West Delta RV Park	864-2212
B Kitten Clean Trailer Park	864-2614
Reservoir Administrators	
D.M.A.D. Company	864-2494

Pollution Assessment

Nonpoint pollution sources include the following: Sedimentation and nutrient loading from logging, grazing, feedlots and cropland. Human wastes, litter and toxins from recreation. Household wastes and nutrient loading from urban areas. Sedimentation and heavy metal production from active and inactive mines. Essentially, all non-point pollution sources occur in the watershed.

Cattle graze in the watershed and around the reservoir.

Several active mines are located in the immediate watershed, with several others scattered throughout the remainder of the watershed. Included are the Ashgrove Cement Company, which quarries stone at the Neilson Quarry, about 10 miles upstream from Leamington on U-132, and the Leamington Quarry, which mines limestone/dolomite for the Ashgrove Cement Company, and discharges 5 miles upstream from Leamington.

All point pollution sources are above the upstream

reservoirs and do not have a direct effect on water quality in the DMAD. They are listed with the Sevier Bridge Reservoir information.

Beneficial Use Classification

The state beneficial use classifications include: boating and similar recreation (excluding swimming) (2B), warm water game fish and organisms in their food chain (3B) and agricultural uses (4).